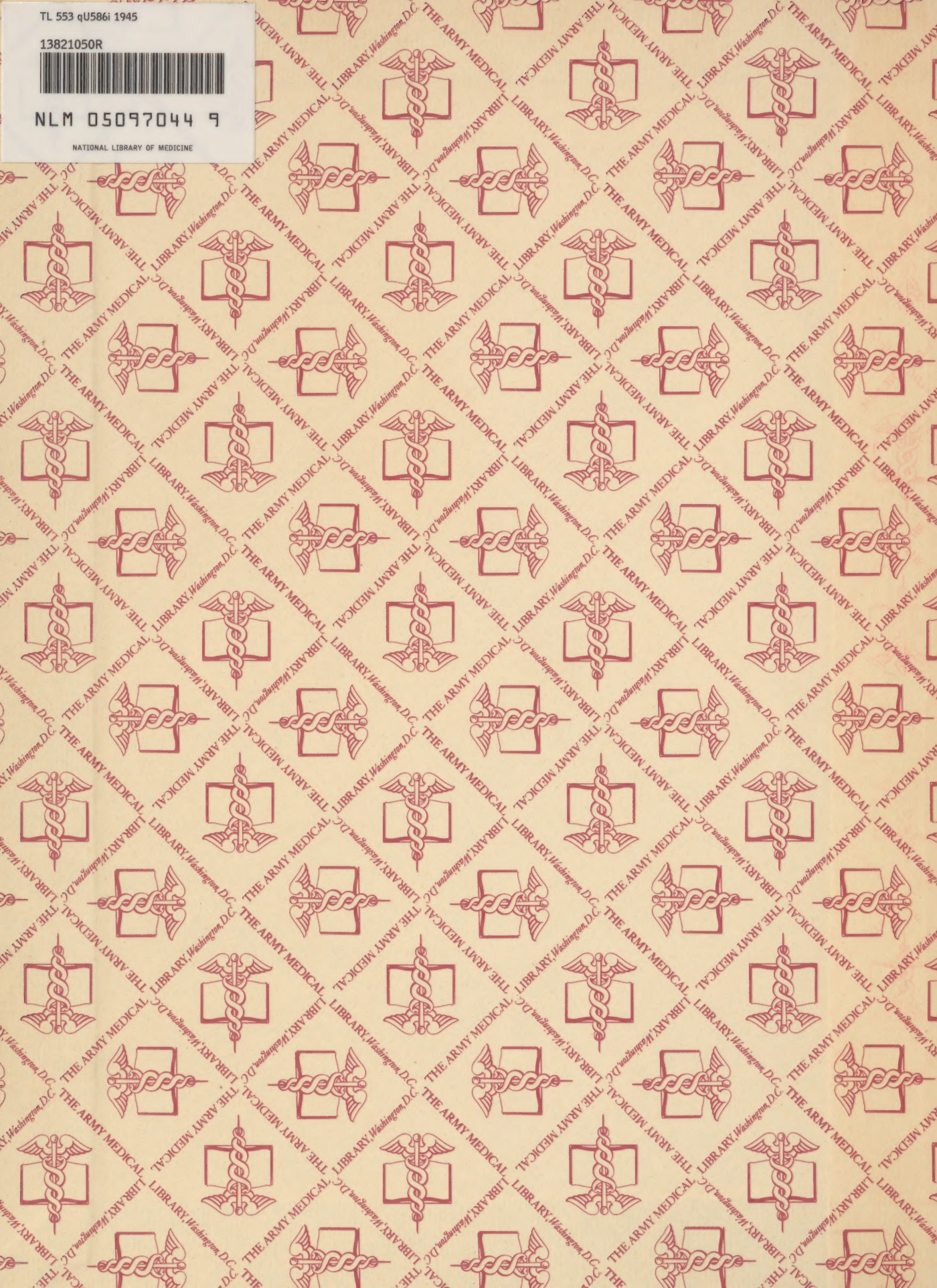

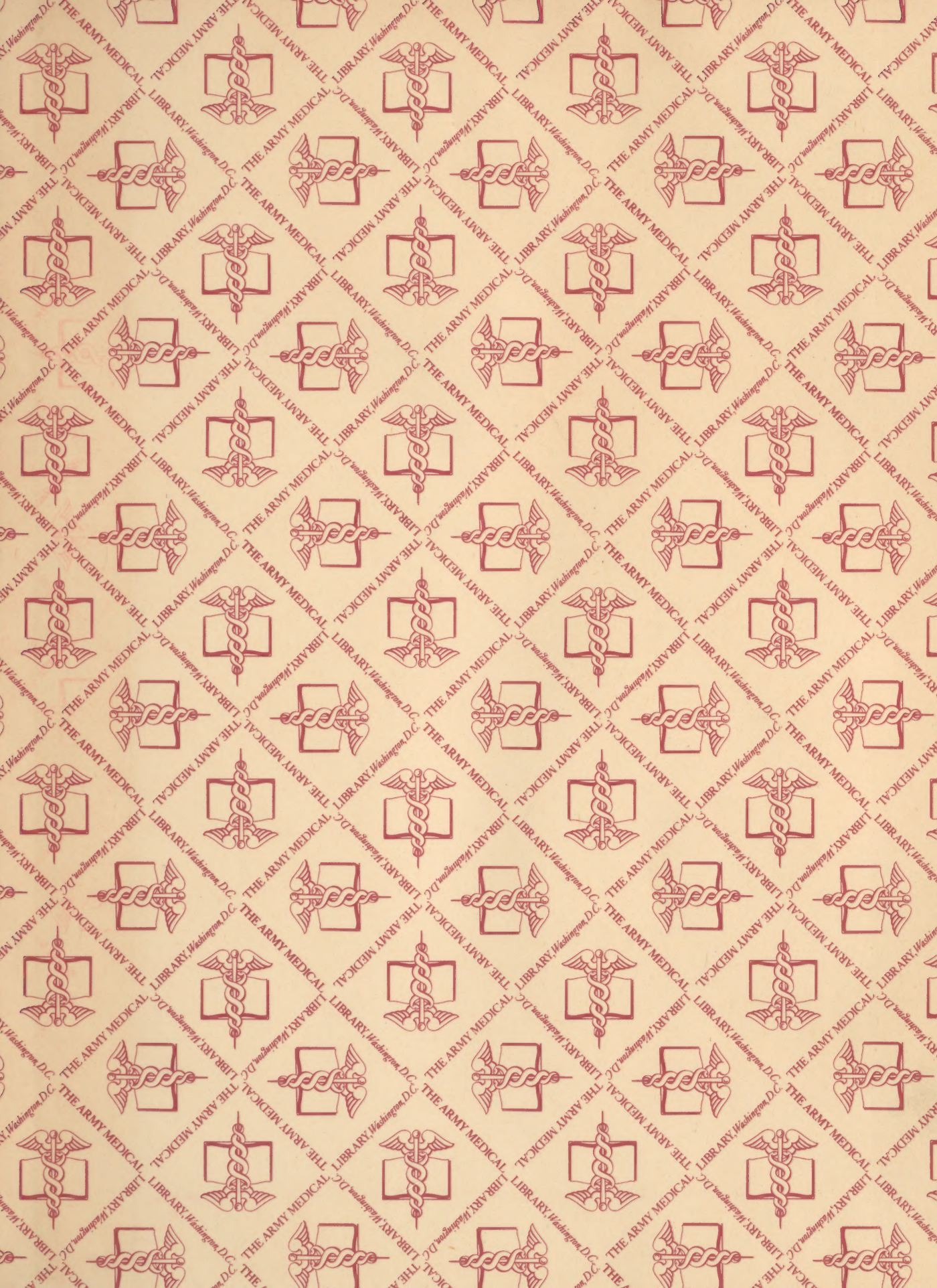
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(1)

The Influence of Age and Experience On Aircraft Accident Rates

GENERAL: The operation of modern, high speed military aircraft taxes the ability of the pilot to the limit of human capabilities so that the slightest lapse in attention or temporary lowering of efficiency is more than likely to result in an accident. This fact has long been recognized and every effort has been made to achieve and maintain peak efficiency of flying personnel by rigorous selection, thorough training, and the best possible medical care by trained flight surgeons. The degree of selection of pilots is indicated by the following figures. Of 1000 men applying for aviation cadet training, about 40% are immediately disqualified by physical examinations and mental screening tests; of the remaining 600, about 70% are eliminated from pilot training at classification centers; of the 180 who enter pilot training, about 50% are eliminated during the course of training and only the remaining 90, or 9% of the original number, are graduated as rated pilots. There is probably no other professional group any where near as highly selected from among the best young men in the country. During their entire career as flyers they are under strict medical supervision, are temporarily suspended from flying for ailments which would be considered trivial in any other occupation, and are indefinitely suspended from flying at the first appearance of any physical, mental, emotional, or professional defects.

In spite of this selection, training, and care, the Office of Flying Safety reports that pilot error is either entirely responsible or a contributing factor in about two-thirds of all aircraft accidents. With the introduction of super high speed jet fighters and other high performance aircraft, there is every reason to believe that the human factor will

increase in importance and the problem of "pilot error" will become even more acute. It is obvious that any measures which will reduce the number of accidents due to human failure are of prime importance to the Air Forces.

The purpose of this paper is to present data on the influence of age and experience on the aircraft accident rate, these being two human factors subject to administrative control.

It is believed that these data are relative to requests which have been made for information on the following subjects:

(1) The determination of the optimal age for flyers and the number of years of service the Air Forces may expect to receive from a pilot once he is trained.

(2) The justification of flight pay.

(3) Information for insurance companies to aid them in setting life insurance rates for flying personnel.

SOURCES OF THE DATA

Two sets of data were required for this study:

(1) The age and experience of the pilot of each aircraft responsible for an accident during a specified period of time, the cause of the accident, and the plane type and model.

(2) The total flying hours, (during the same period of time), of pilots in each age and experience group by plane type and model.

The data on pilot experience in this report covers all the accidents and the total hours flown in the AAF in the Continental U. S., exclusive of the Flying Training Command, during the nine-month period, July 1944 through March 1945.

The data on age covers all the accidents and the total hours flown in

the AAF in the Continental U. S., exclusive of the Flying Training Command, during the six month period October 1944 through March 1945.

The accident data were supplied by the Flying Safety Branch of Flight Operations Division, AC/AS-3 in cooperation with the Office of the Air Surgeon from Aircraft Accident Reports, AAF Form 14. Out of a total of 4638 accidents reported, 273 were omitted from this study because the age or experience of the pilots were unknown. The experience of the pilot of each plane responsible for an accident was obtained from Individual Flight Records, AAF Form 5. The first pilot hours to date as of the end of the month in which the accident occurred were used as a measure of pilot experience. It should be noted that this includes only first pilot time as a rated pilot and does not include student pilot time.

The flying time data were obtained from Individual Flight Records, AAF Form 5, in a study set up as a joint cooperative project by the Office of the Air Surgeon, the Flying Safety Branch of Flight Operation Division, AC/AS-3 and the Office of Statistical Control. The data were obtained as follows:

Each line entry on the individual flight record, AAF Form 5, represents one man day of flying in a particular plane type and model. A representative sample of 5% of all flying done in the Continental U. S. (exclusive of the Flying Training Command) was obtained by coding a card for every twentieth line entry on the Forms 5 for all pilots. The age of the pilot, the experience of the pilot (total first pilot hours to date as of the end of the month), the first pilot hours and co-pilot hours flown that day, the plane type and model, and the date were recorded on each card. The cards were then tabulated to obtain flying time by age and experience of the pilots for each plane type and model. Multiplying the hours derived from

the sample by 20 gave a close approximation to the total hours flown. In order to obtain a more accurate estimate, correcting for minor sampling errors, the sample totals for each age and experience group in each plane type and model were multiplied by the ratio between the sample totals for each plane type and model and the total hours for that type and model as derived from AAF Form 110. (These ratios were close to 20, though not exactly 20). As the sample for the entire nine month period was very large, covering 223,736 man days of flying, the flying time estimates are close to being exact and are certainly accurate enough for any practical purposes.

EXPERIENCE VS. ACCIDENT RATES

Table 1 and Figure 1 show the accident rates per hundred thousand flying hours by pilot experience for all plane types, heavy bombers (B-17 and B-24), medium bombers (B-25 and B-26), light bombers (A-20 and A-26), all single engine fighters, and transports (C-45, C-46, C-47, C-53, and C-78). The pilots were divided into ten groups by experience for all plane types. The data for specific plane types were divided into just seven groups by pilot experience since the total flying hours was not sufficient to warrant a finer breakdown.

The accident rate for all plane types was 100.1 per 100,000 flying hours for pilots with less than 50 hours first pilot experience. With increasing pilot experience, the rate dropped steadily down to a rate of only 25.7 for pilots with 1500 to 2000 hours experience. In other words, pilots with less than 50 hours experience have nearly 4 times the accident rate of pilots with 1500 to 2000 hours experience.

Pilots with over 2000 hours experience had an accident rate of 39.1

which is appreciably higher than the rate for pilots with 1500 to 2000 hours and about the same as for pilots with 500 to 750 hours experience.

The curve for heavy bombers is just about parallel to the curve for all plane types, showing almost the same relative drop in accident rates with increasing experience, although all the rates are much lower. The rate for pilots with less than 50 hours experience was 55.0 as compared with a rate of 16.0 for pilots with 1000 to 2000 hours experience. However, while the rate for pilots with over 2000 hours experience increases somewhat, this increase is small, the rate rising to only 19.0.

The single engine fighters showed the greatest relative drop in accident rates with increasing pilots experience (from 275.7 for pilots with under 50 hours experience to 67.4 for pilots with 500 to 1000 hours experience). But the accident rate then rose sharply with a further increase in pilot experience to 84.5 for pilots with 1000 to 2000 hours experience and 188.6 for pilots with over 2000 hours experience.

Light bombers showed the same general trends as single fighters, transports were similar to heavy bombers, and medium bombers fell in between.

Table 2 and Figure 2 show the accident rates by pilots experience for several plane models, the P-38, P-40, P-47, B-24, B-25, etc. These curves show the same trends as previously shown for their plane type groups. These curves are not quite as smooth since they are based on a smaller total number of flying hours and accidents. The P-38 appears to have the greatest correlation between pilot experience and accident rates.

The accident rates for all plane types decrease rapidly with increasing pilot experience up to a certain point and then increase in pilots with a great deal of experience. In single engine fighters, light bombers, and

medium bombers the lowest accident rates are for pilots with 500 to 1000 hours experience. In heavy bombers, and transports the lowest rates are for pilots with 1000 to 2000 hours experience.

AGE VS. ACCIDENT RATES

The accident rates per 100,000 flying hours by age of pilots for all plane types, heavy bombers, and single engine fighters are shown in Table 3 and Figure 3.

The accident rates for all plane types decrease rapidly from 129.3 for pilots under 22 years of age to 23.2 for pilots from 30 through 34 years of age. Pilots 35 years of age and older have a somewhat higher accident rate. In interpreting the slight increase in pilots 35 years old and over it should be noted that older pilots in staff positions tend to do their flying in safer plane types, so the rise with age is less when all plane types are combined than when plane types are considered separately.

In heavy bombers, the accident rates decrease very rapidly from 66.4 for pilots under 22 years of age to only 5.9 for pilots from 30 through 34 years of age. After age 35, the accident rates increase up to 31.7 for pilots 40 years of age and older.

The accident rates in single engine fighters decrease from 171.4 for pilots under 22 years of age down to 66.2 for pilots 24 and 25 years of age. The rate decreases very slightly from 24 through 29 years of age and then begins to rise reaching a rate of 172.9 for pilots 40 years of age and older.

AGE AND EXPERIENCE

Since age and experience are correlated, the experience trends previously discussed were influenced by the age factor and conversely the age trends were influenced by the experience factor. In order to study the two factors separately, it is necessary to [illegible]

of pilots in the same age groups and plot accident trends by age of pilots in the same experience groups. This can only be done for a few plane types since there are not many older pilots with little experience or young pilots with a great deal of experience.

Table 4 and Figure 4 show for single engine fighters the accident rate by experience for pilots under 22 years of age, pilots 23 and 24, pilots 24 and 25, and pilots 26 through 29. There were not enough pilots over 30 with little experience to plot reliable trends for the older age groups. The accident rates for pilots under 22 years of age are all much higher than for pilots up to 29 years of age. In each age group, the accident rate decreases from a maximum for pilots with less than 50 hours experience down to a minimum for pilots with 150 to 500 hours experience (500 to 1000 hours experience for the age group 24-25) and then increases again with increasing experience.

By comparing Figure 4 with Figure 1, it is seen that the apparent effect of experience on the accident rates is somewhat less as great if age is held constant. In other words, the combined effects of age and experience has the greatest influence on accident rates.

The influence of age on accident rates holding experience constant is shown by Table 4 and Figure 5. This is shown in Figure 4 for several experience groups of single engine fighters and heavy bombers. The combined rates for all plane types are not shown since the fact that older pilots tend to fly safer plane types obscures the trends unless specific plane types are studied separately.

In single engine fighter pilots with over 1000 hours experience, the accident rates fall rapidly with age from age under 22 through age 30-34 and then rise in pilots of ages 35-39. In single engine fighter pilots

with from 150 to 500 hours experience, the accident rates increase beginning with age 30-34.

Comparing Figure 5 with Figure 4 and Figure 3 with Figure 1, it appears that age has a greater influence on the accident rate than experience, although both are very important. Possible reasons for this will be discussed later.

PILOT ERROR

Each accident reported on AAF Form 14 is analyzed by the accident investigating board and by the Office of Flying Safety to determine the causes. This is obviously a very difficult task in many instances, particularly if the pilot is killed. For the purposes of this study, each accident has been classified according to whether, in the opinion of the analysts, pilot error was the only cause, pilot error and some other cause were involved, or whether no pilot error was involved.

Table 5 and Figure 6 show the accident rates for all plane types by pilot experience and Table 6 and Figure 7 show the accident rates for all plane types by age of pilot for all accidents, all accidents involving pilot error, accidents involving pilot error only, and accidents with no pilot error. In each of these two figures, it is seen that the four curves follow the same general trends. The accidents attributed to pilot error only have, as would be expected, the greatest correlation with both age and experience.

The accidents in which no pilot error could be proven also show a high correlation with age and a significant correlation with pilot experience. This is interpreted to mean that the ability of the pilot has an influence on the accident rate even in those accidents in which the fact cannot be definitely demonstrated by a study of individual records. This does not mean that "pilot error", as strictly defined, is necessarily responsible

for the accidents. Other factors may be involved. For example, rough treatment of a plane over a long period of time may eventually cause material failure resulting in an accident although no pilot error is involved at the instant of the accident. On the other hand, a highly skilled pilot may become aware of minor material deficiencies and have them corrected before they become serious enough to cause an accident.

In other words, this analysis suggests that the human element may be even more important in accidents than would be indicated by the report that pilot error is directly involved in two-thirds of all accidents.

TYPES OF PILOT ERROR

Pilot error may be subdivided into the following six types: misuse of controls, violations, lack of proficiency, failure to observe, misjudged distance, and other pilot error. Since more than one type may be involved in a single accident, the total of the types, as shown in Tables 7 and 8, is greater than the total number of pilot error accidents.

Figure 8 shows accident rates for all plane types by pilot experience and Figure 9 shows accident rates by age for each of these six types of pilot error. All six types are correlated with both pilot experience and age. Misuse of controls is the most common type of pilot error.

Lack of proficiency is the most highly correlated with pilot experience and decreases rapidly as experience increases. Violations are the most highly correlated with age, decreasing rapidly through age 34 and then increasing again in the older age groups.

[illegible]

It has been shown that aircraft accident rates are highly correlated

with both pilot experience and age. The difference is accident rates between various age and experience groups in the same type of aircraft is far greater than the difference between accident rates of different models of the same type and almost as great as the differences between the several aircraft types.

A biological interpretation of these trends is interesting, though perhaps of little administrative significance. One might surmise that the very high accident rates of young pilots, particularly those under 22 years old, is due to recklessness and a lack of realization of danger. With more maturity the pilots become more conservative and the accident rates go down. The increasing accident rates in the older ages may be interpreted in terms of the degeneration of psychomotor and sensory responses with increasing age and to the development of a mental state of anxiety and apprehension perhaps induced or reconstituted by the strain of flying. The increased accident rates in young flyers with over 1000 hours experience is harder to account for. Perhaps it may be partly explained by the over confidence of young pilots with a lot of experience.

The high accident rates among very experienced pilots and in the older age groups are probably due in part to present administrative policies. In general, the older and more experienced pilots are of higher rank than the younger and less experienced men. Above a certain level of age and experience a very large proportion of pilots are assigned to administrative duties and only accomplish the bare minimum of four hours flying a month required by regulations. Thus, while their total flying hours may be high, they have had little recent experience and perhaps almost no experience on the newer plane types. Combined with this, if they are senior in command pilots, they are given a freedom from control also in some instances

is out of proportion to their current proficiency. It is doubtful whether efficiency can be maintained in any complex manipulative task with so little practice.

Judging from accident rates alone, it would appear to be unwise to give pilot ratings to very young men. A lower age limit of about 22 would seem to be indicated for fighter pilots and perhaps as high as 24 for heavy bomber pilots. On the same basis, it appears that fighter pilots should not be much over 30 years old and that heavy bomber pilots should not be much over 35. A study of combat records by age might lead to somewhat different conclusions.

This would seem to indicate that after training a pilot, the Air Forces can only expect to use him efficiently for about ten years assigned to primary duty as a first pilot.

This period of active pilot duty might perhaps be extended in two ways. A careful study might reveal that with increased discipline and supervision the accident rate of young pilots could be reduced. This is suggested, for example, by the high inverse correlation of violations and age. Perhaps a longer period of supervised flying before awarding a pilot's rating would have the desired results.

On the other hand, it seems likely that pilots would retain high efficiency to an older age if they were never removed for long from primary duty as first pilots if they were ever to be reassigned to such duty. A study similar to this should be made to determine the minimum first pilot hours per month which would be required to maintain peak efficiency especially in older men. This might lead to a regulation requiring considerably more than the present minimum of four hours per month flying up to a grade or age limit after which a pilot would no longer be eligible for assignment to primary duty as first pilot.

It is suggested that research studies of the human factors in flying, particularly in respect of the effect of training and operational policies and pilot selection methods, would be of great value in lowering the accident rate and increasing efficiency.

Prepared By:

Statistics Branch
Office of The Air Surgeon
12 December 1945

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TABLE 1. ACCIDENT RATES PER 100,000 FLYING HOURS BY EXPERIENCE OF PILOT
Total AAF, Continental U. S. Exclusive of the Flying Training Command
NINE MONTH PERIOD - JULY 1944 - MARCH 1945

(a) ALL PLANE TYPES

Experience of Pilot (First Pilot Hours To Date)	Flying Hours	All Accidents	
		No.	Rate
Under 50	425766	426	100.1
50 - 99	1054436	888	84.2
100-149	976343	662	67.8
150-249	897766	541	60.3
250-499	1220229	646	52.9
500-749	1185328	458	38.6
750-999	867311	300	34.6
1000-1499	909815	266	28.9
1500-1999	361942	93	25.7
2000& over	168641	66	39.1
Total	8147777	4366	53.6

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TABLE 1 ACCIDENT RATES PER 100,000 FLYING HOURS BY EXPERIENCE OF PILOT
Total AAF, Continental U. S. Exclusive of the Flying Training Command
NINE MONTH PERIOD - JULY 1944 - MARCH 1945

(b) BY PLANE TYPE

EXPERIENCE OF PILOT (FIRST PILOT HELMS TO DATE)	HEAVY BOMBERS (B-17 & B-24)			MEDIUM BOMBERS (B-25 & B-26)			LIGHT BOMBERS (A-20 & A-26)			SINGLE ENGINE FIGHTERS			TRANSPORT (C-45, 46, 47, & 78, 53)		
	FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS	
		NO.	RATE		NO.	RATE		NO.	RATE		NO.	RATE		NO.	RATE
Under 50	183748	101	55.0	31883	14	43.9	7876	9	114.3	55494	153	275.7	77409	27	34.9
50 - 99	427051	161	37.7	80615	30	37.2	26474	22	83.1	321536	436	133.1	98619	34	34.5
100-199	376115	117	31.1	62687	22	35.1	36515	22	60.2	312252	315	100.9	74882	18	24.0
200-499	444952	129	29.1	128365	43	33.5	66528	43	64.6	528237	541	86.1	357596	77	21.5
500-999	469364	92	19.9	204320	36	17.7	75060	38	50.6	414011	279	67.4	410819	64	15.6
1000-1999	350948	96	16.0	71538	17	23.8	30240	20	66.3	120705	102	84.5	389411	50	12.8
2000 & over	36817	1	19.0	11992	6	50.0	2683	3	111.8	9015	17	188.6	48667	12	24.7
Total	2356625	663	28.1	590200	168	28.5	245976	157	63.8	1875160	1843	98.3	1457403	282	19.3

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Table 2

Accident Rates Per 100,000 Flying Hours by Experience of Pilot
Total AAF, Continental U.S. Exclusive of The Flying Training Command
Nine Month Period - July 1944 - March 1945

Experience of Pilot (First Pilot Hours To Date)	B-17			B-24			B-25			B-26			P-38		
	Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents	
		No.	Rate		No.	Rate		No.	Rate		No.	Rate		No.	Rate
Under 50	73390	33	45.0	110358	68	61.6	25270	8	31.7	6613	6	91.0	2436	15	616.0
50-99	190734	66	34.6	236317	95	40.2	51217	13	25.4	29398	17	58.0	33202	71	114.0
100-149	187859	56	29.8	188256	61	32.4	27503	6	22.0	35184	16	45.5	75467	87	115.3
150-499	306792	65	21.2	188160	64	34.0	74598	20	26.8	53767	23	42.8	85351	92	107.8
500-999	270979	43	15.9	215805	49	22.7	136968	26	18.7	64152	10	15.6	82585	52	63.0
1000-1999	163462	31	19.0	187486	25	13.3	54790	14	25.6	16748	3	17.9	18966	16	84.4
2000&over	22907	4	17.5	13910	3	21.6	9869	4	40.5	2123	2	94.2	2331	1	43.0
Total	1,216,127	298	24.5	1,140,292	365	32.0	382,213	91	24.0	207,985	77	37.0	300,338	334	111.2

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Table 2 (continued)

Experience of Pilot (First Pilot Hours To Date)	P-40			P-47			P-51			C-47/53			C-78		
	Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents	
		No.	Rate		No.	Rate		No.	Rate		No.	Rate		No.	Rate
Under 50	17680	38	215.0	28284	84	297.1	3521	12	313.6	65617	15	23.1	7245	7	97.0
50 - 99	109053	154	141.2	162722	196	120.5	21548	29	134.6	86266	25	29.1	6323	3	47.4
100-149	126464	140	111.0	150265	145	96.5	30977	18	58.1	63032	9	15.0	7257	8	110.2
150-499	259738	191	73.5	235138	207	88.0	113314	99	87.4	243251	42	17.3	42656	15	35.0
500-999	151529	90	59.4	165406	107	64.7	68356	45	65.8	258973	23	9.0	33601	13	38.7
1000-1999	41003	27	65.8	38395	44	114.6	25709	13	50.3	274883	26	9.5	23774	6	25.2
2000&over	2578	4	55.2	2631	1	265.5	2563	3	135.2	26025	5	19.2	6377	2	31.4
Total	708045	644	91.1	782847	793	101.3	271376	219	81.0	1014048	145	14.3	142433	56	39.3

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Table 3

Accident Rates Per 100,000 Flying Hours by Age of Pilot
Total AAF, Continental U.S. Exclusive of The Flying Training Command
Six Month Period - October 1944 - March 1945*

Age of Pilot	All Plane Types			Heavy Bombers (B-17 and B-24)			Single Engine Fighters		
	Flying Hours	Accidents		Flying Hours	Accidents		Flying Hours	Accidents	
		No.	Rate		No.	Rate		No.	Rate
Under 22	470120	608	129.3	155211	103	66.4	184358	316	171.4
22 - 23	1103317	699	63.4	353467	138	39.0	368513	307	83.3
24 - 25	1310508	503	38.4	395036	81	20.5	290227	192	66.2
26 - 27	1024924	352	34.3	297104	57	19.2	176544	117	66.3
28 - 29	641039	193	30.1	191331	30	15.7	97692	61	62.4
30 - 34	371236	86	23.2	67790	4	5.9	40608	28	69.0
35 - 39	93320	29	31.1	10996	2	18.2	6576	8	121.7
40 & over	70183	19	27.1	9459	3	31.7	1157	2	172.9
Total*	5084847	2483	49.0	1480394	418	28.2	1165675	1031	88.4

*Note that this table by Age of Pilot covers a different period of time than the tables by Experience of Pilot (tables 1, 2, etc.). The total rates are therefore somewhat different on the two sets of tables.

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TABLE 4. .ACCIDENT RATES PER 100,000 FLYING HOURS BY AGE AND EXPERIENCE OF PILOT
Total AAF, Continental U.S. Exclusive of the Flying Training Command
SIX MONTH PERIOD - OCTOBER 1944 - MARCH 1945

(a) Single Engine Fighters

AGE OF PILOT	EXPERIENCE OF PILOT - FIRST PILOT HOURS TO DATE														
	Under 50			50 - 149			150 - 499			500 - 999			1000 and Over		
	FLYING HOURS	ACCIDENTS		FLYING	ACCIDENTS		FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS		FLYING HOURS	ACCIDENTS	
		NO.	RATE		NO.	RATE		NO.	RATE		NO.	RATE		NO.	RATE
Under 22	6751	24	355.5	87180	145	166.3	85763	133	155.1	4009	12	299.3	655	2	305.3
22 - 23	8765	12	136.9	128223	106	82.7	181882	140	77.0	42471	40	94.2	7172	9	125.5
24 - 25	3469	5	144.1	49794	37	74.3	107516	68	63.2	107907	57	52.8	21541	25	116.1
26 - 29	3107	4	128.7	32792	22	67.1	76771	48	62.5	112668	70	62.1	48898	34	69.5
30 - 34	565	1	177.0	4257	1	23.5	7778	8	102.9	15604	10	64.1	12404	8	64.5
35 - 39	160	0	-	1017	1	98.3	1574	2	127.1	672	0	-	3153	5	158.6

(b) Heavy Bombers (B-17 and B-24)

Under 22	26953	18	66.8	97276	64	65.8	28480	18	63.2	1816	3	165.2	686	0	-
22 - 23	42597	23	54.0	188179	62	32.9	77043	35	45.4	36114	16	44.3	9534	2	21.0
24 - 25	22813	10	43.8	104642	26	24.8	106798	13	12.2	106365	20	18.8	54418	12	22.1
26 - 29	19975	7	35.0	94554	22	23.3	115874	24	20.7	139536	19	13.6	118496	15	12.7
30 - 34	735	0	-	2158	0	-	11301	0	-	22822	1	4.4	30774	3	9.7
35 - 39	93	0	-	0	0	-	894	0	-	2453	1	40.8	7556	1	13.2

NOTE: Since few young pilots have much experience and few older pilots have little experience, the flying hours and number of accidents are very small in some of the boxes of this table. In interpreting data, not much weight should be attached to the rates based on less than 5 accidents

SECURITY INFORMATION

TABLE 5. ACCIDENT RATES PER 100,000 FLYING HOURS BY EXPERIENCE OF PILOT AND BY CAUSE OF ACCIDENT FOR ALL PLANE TYPES

Total AAF, Continental U.S. Exclusive of the Flying Training Command

NINE MONTH PERIOD - July 1944 - March 1945

EXPERIENCE OF PILOT (FIRST PILOT HOURS TO DATE)	CAUSE OF ACCIDENT										
	TOTAL, ALL ACCIDENTS			ALL ACCIDENTS INVOLVING PILOT ERROR		PILOT ERROR ONLY CAUSE		NO PILOT ERROR		CAUSE UNDETERMINED	
	FLYING HOURS	ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS	
		NO	RATE	NO.	RATE	NO.	RATE	NO	RATE	NO	RATE
Under 50	425766	426	100.1	278	65.3	107	25.1	115	27.0	33	7.8
50 - 99	1054436	888	84.2	592	56.1	276	26.2	262	24.8	34	3.2
100-149	976343	662	67.8	424	43.4	197	20.2	212	21.7	26	2.7
150-249	897766	541	60.3	345	38.4	185	20.6	173	19.3	23	2.6
250-499	1220229	645	52.9	388	31.8	190	15.6	227	18.6	31	2.5
500-749	1185328	458	38.6	273	23.0	106	8.9	171	14.4	14	1.2
750-999	867311	300	34.6	155	17.9	56	6.5	135	15.6	10	1.2
1000-1499	989815	286	28.9	160	16.2	59	6.0	117	11.8	9	0.9
1500-1999	361942	93	25.7	42	11.6	12	3.3	50	13.8	1	0.3
2000&over	168841	66	39.1	29	17.2	9	5.3	31	18.4	6	3.6
Total	8147777	4366	53.6	2686	33.0	1197	14.7	1493	18.3	187	2.3

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TABLE 6. ACCIDENT RATES PER 100,000 FLYING HOURS BY AGE OF PILOT AND BY CAUSE OF ACCIDENT FOR ALL PLANE TYPES
Total AAF, Continental U.S. Exclusive of the Flying Training Command
SIX MONTH PERIOD - October 1944 - March 1945

AGE OF PILOT	CAUSE OF ACCIDENT										
	TOTAL, ALL ACCIDENTS			ALL ACCIDENTS INVOLVING PILOT ERROR		PILOT ERROR ONLY CAUSE		NO PILOT ERROR		CAUSE UNDETERMINED	
	FLYING HOURS	ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS	
		NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE
Under 22	470120	608	129.3	405	86.1	220	46.8	177	37.7	26	5.5
22 - 23	1103317	699	63.4	452	41.0	235	21.3	210	19.0	37	3.4
24 - 25	1310508	503	38.4	301	23.0	134	10.2	182	13.9	20	1.5
26 - 27	1024924	352	34.3	212	20.7	89	8.7	119	11.6	21	2.0
28 - 29	641039	193	30.1	116	18.1	40	6.2	80	12.5	7	1.1
30 - 34	371236	86	23.2	57	15.4	25	6.7	32	8.6	4	1.1
35 - 39	93320	29	31.1	17	18.2	8	8.6	11	11.8	1	1.1
40&over	70183	19	27.1	10	14.2	2	2.9	7	10.0	2	2.9
Total	5084847	2489	49.0	1563	30.7	753	14.8	808	15.9	118	2.3

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Table 7

Accident Rates Per 100,000 Flying Hours by Experience of Pilot and by Types of Pilot Error
Total AAF, Continental U.S. Exclusive of the Flying Training Command
Nine Month Period - July 1944 - March 1945

Experience of Pilot (First Pilot Hours To Date)	All Accidents Involving Pilot Error			Misuse of Controls		Violation		Lack of Proficiency		Failure To Observe		Misjudged Distance		Other Pilot Error	
	Flying Hours	Accidents		Accidents		Accidents		Accidents		Accidents		Accidents		Accidents	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Under 50	425,160	278	65.3	202	47.4	22	4.9	130	30.5	60	14.1	9	2.1	54	12.7
50 — 99	1054436	592	56.1	462	43.8	46	4.4	158	15.0	123	11.7	18	1.7	102	9.7
100-149	976343	424	43.4	327	33.5	34	3.5	74	7.6	96	9.8	13	1.3	80	8.2
150-499	2117995	733	34.6	515	24.3	63	3.0	124	5.9	168	7.9	36	1.7	173	8.2
500-999	2052639	428	20.9	292	14.2	37	1.8	98	4.8	96	4.7	12	0.6	112	5.5
1000-1999	1351751	202	14.9	125	9.2	20	1.5	47	3.5	40	3.0	6	0.4	67	5.0
2000&over	168841	29	17.2	17	10.1	0	0	5	1.8	10	5.9	0	0	11	6.5
TOTAL	8347777	2686	33.0	1940	23.8	221	2.7	636	7.8	593	7.3	94	1.2	599	7.4

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TABLE 8. ACCIDENT RATES PER 100,000 FLYING HOURS BY AGE OF PILOT AND BY TYPE OF PILOT ERROR

Total AAF, Continental U. S. Exclusive of the Flying Training Command

SIX MONTH PERIOD - OCTOBER 1944 - MARCH 1945

AGE OF PILOT	ALL ACCIDENTS INVOLVING PILOT ERROR			MISUSE OF CONTROLS		VIOLATIONS		LACK OF PROFICIENCY		FAILURE TO OBSERVE		MISJUDGED DISTANCE		OTHER PILOT ERROR	
	FLYING HOURS	ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS		ACCIDENTS	
		NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE	NO.	RATE
Under 22	470120	405	86.1	277	58.9	41	8.7	70	14.9	77	16.4	26	5.5	86	18.3
22 - 23	1103317	452	41.0	296	26.8	44	4.0	81	7.3	95	8.6	34	3.1	115	10.4
24 - 25	1310508	301	23.0	226	17.2	33	2.5	75	5.7	51	3.9	10	0.8	70	5.3
26 - 27	1024924	212	20.7	144	14.0	19	1.9	57	5.6	41	4.0	9	0.9	65	6.3
28 - 29	641039	116	18.1	67	10.5	10	1.6	23	3.6	20	3.1	10	1.6	42	6.6
30 - 34	371236	50	13.5	32	8.6	2	0.5	13	3.5	7	1.9	3	0.8	17	4.6
35 - 39	93320	17	18.2	10	10.7	1	1.1	7	7.5	2	2.1	1	1.1	6	6.4
40&over	70183	10	14.2	4	5.7	1	1.4	1	1.4	3	4.3	1	1.4	2	2.8
Total	5034647	1563	30.7	1056	20.8	151	3.0	327	6.4	296	5.8	94	1.8	403	7.9

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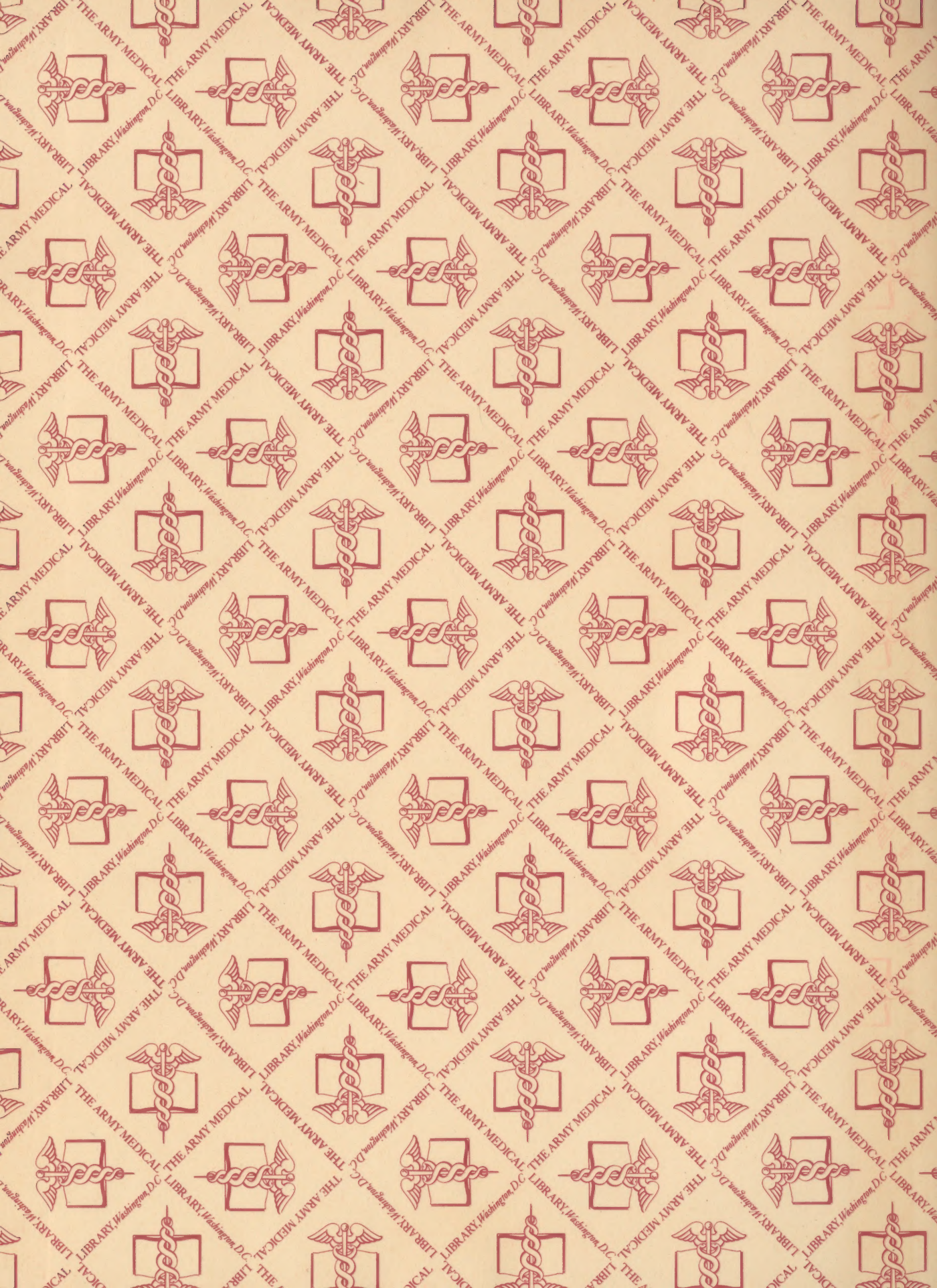
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